PROSPECTIVE COMPARISON OF INTUBATING CONDITIONS WITH VIDEO LARYNGOSCOPE AND MACINTOSH LARYNGOSCOPE IN RANDOMLY SELECTED ELECTIVE ADULT SURGICAL PATIENTS

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CERTIFICATE

This is to certify that the dissertation entitled, "**PROSPECTIVE COMPARISON OF INTUBATING CONDITIONS WITH VIDEO LARYNGOSCOPE & MACINTOSH LARYNGOSCOPE IN RANDOMLY SELECTED ELECTIVE ADULT SURGICAL PATIENTS**" submitted by **Dr.ARULVELAN. A** in partial fulfillment for the award of the degree of Doctor of Medicine in Anesthesiology by the Tamilnadu Dr.M.G.R. Medical University, Chennai is a bonafide record of the work done by him in the Department of Anesthesiology, Madras Medical College, during the academic year 2007 -2010.

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INTRODUCTION

Tracheal intubation using a laryngoscope is considered to be gold standard[1] of airway management during administration of general anaesthesia and in critical care setting because of its several advantages including

- Isolation of respiratory tract from GI system and hence minimal risk of aspiration;
- Allows delivery of anaesthetic gases and oxygen via positive pressure ventilation without inflation of stomach
- Access to tracheobronchial tree for pulmonary hygiene and drug administration (e.g. inhaled bronchodilators)
- Improved surgical access to head and neck.

Airway management is important in anaesthesia because adverse respiratory events are responsible for 75% of ASA closed claims[2]. Of these inadequate ventilation is the main culprit (38%), followed by oesophageal placement of tracheal tube(17%) and difficult intubation(18%). Approximately 600 patients[3] die each year in the developed world from complications related to airway management and the scenario in the under developed world is much grimmer.

STRUCTURE AND FUNCTION OF THE UPPER AIRWAYS [4,5,6]

Anatomically airway is the passage through which the air passes during respiration. It may be divided into upper and lower airway. The upper airway comprises Nasal cavity, oral cavity, nasopharynx, oropharynx, pharynx and larynx.

Nasal cavity :

Nasal cavity extends from nares to end of the turbinates. The normal airway begins functionally at the nares. As air passes through the nose, the important functions of warming and humidification occur. The nose is the primary pathway for normal breathing. The nasal cavities are divided by nasal septum. The roof is formed by cribriform plate of the ethmoid bone. The bony lateral wall is the origin of the three bony turbinates that project into the nasal cavity. Openings in the lateral wall communicate with paranasal sinuses.

Oral cavity :

It extends from mouth opening to anterior tonsillar pillar. Contracture of mouth and lips can lead to difficult laryngoscopy. The roof of the mouth is bounded by alveolar arch and teeth and consists of the hard palate anteriorly and soft palate posteriorly. The tongue makes up the most of the mouth, which is bounded by the mandible and teeth. The ability to achive good mouth opening is

important for many airway procedures. Initial mouth opening is achieved by rotation within the temperomandibular joint and subsequent opening by sliding of the condyles of the mandible within the joint.

Pharynx :

The pharynx is a fibromuscular tube that extends from the base of the skull to the lower border of cricoids cartilage. It joins the nasal and oral cavities above; with larynx and esophagus below. It is divided into nasopharynx and oropharynx.

The nasopharynx :

Extends from the posterior end of turbinates to posterior pharyngeal wall above the soft palate and consists of the nasal cavity, septum, turbinates and adenoids.

The oropharynx :

Extends from the soft palate abov and epiglottis below; and anteriorly from tonsillar pillar to posterior pharyngeal wall. It includes the tonsils, uvula and the epiglottis. The tongue is the principal source of oropharyngeal obstruction, usually because of decreased tone of the genioglossus muscle. The latter contracts to move the tongue forward during inspiration and thus acts as a pharyngeal dilator. The vallecula is the space between epiglottis and base of the tongue. It has paired depressions on both sides of glosso epiglottic fold.

Laryngoscope blade tip is positioned in vallecula during conventional laryngoscopy. Gentle upward pressure on the vallecula with laryngoscope blade tensions hyoepiglottic ligament and indirectly elevates the larynx and helps in the alignment of laryngeal and pharyngeal axes.

Larynx :

The larynx, which lies at the level of the third through sixth cervical vertebrae, serves as the organ of phonation and as a valve to protect the lower airways from the contents of the alimentary tract.

The laryngeal cavity extends from the epiglottis to the lower level of the cricoid cartilage. The larynx bulges posteriorly into the laryngopharynx, with the pyriform fossa lying on each side. It is suspended from the hyoid bone by the thyrohyoid membrane.

The structure consists of muscles, ligaments, and a framework of cartilages. These include the thyroid, cricoid, arytenoids, corniculates, and the epiglottis. The latter, a fibrous cartilage, has a mucous membrane covering that reflects as the glossoepiglottic fold onto the pharyngeal surface of the tongue. The epiglottis projects into the pharynx and overhangs the laryngeal inlet. However, it is not absolutely essential for sealing off the airway during swallowing.

The inlet is formed by the epiglottis, which joins to the apex of the arytenoid cartilages on each side by the aryepiglottic folds. Inside the laryngeal cavity one first encounters the vestibular folds, which are narrow bands of fibrous tissue on each side. These extend from the anterolateral surface of each arytenoid to the angle of the thyroid where the latter attaches to the epiglottis. These folds are referred to as the false vocal cords and are separated from the true vocal cords by the laryngeal sinus or ventricle.

The true vocal cords are pale white ligamentous structures that attach to the angles of the thyroid anteriorly and to the arytenoids posteriorly. The triangular fissure between these vocal cords is termed the glottic opening, which represents the narrowest segment of the laryngeal opening in adults.

Cricoid cartilage is a complete ring shaped cartilage and continues with trachea. In young children (<10 years old), the narrowest segment lies just below the cords at the level of the cricoid ring.

The mean length of the relaxed open glottis is about 23 mm in males and 17 mm in females.

Conventional laryngoscopy is performed in the supine position. In this position oral, pharyngeal and laryngeal axes of the patient are offset, making it difficult to obtain a good view of glottis by the conventional laryngoscope. A slight neck flexion of 25 – 35^0 and head extension of approximately 85^0 at atlanto occipital joint helps to align the axes called as Magill's (sniffing) position[7].

As successful direct laryngoscopy and intubation requires the alignment of oral, pharyngeal & laryngeal axes the intubation and visual confirmation are often complicated by the anatomical abnormalities of upper airway, comorbid illness, position of the patient as well as by the location and other external factors.

In recent decades, video techniques using fibre optic technology have been employed in the majority of procedure. Video laryngoscopes have rigid curved blades to match the anatomical alignment[8] thus improving laryngeal view even in patients who can't be kept in ideal sniffing position.

OVERVIEW OF LARYNGOSCOPE DESIGN[9] :

Commonly used laryngoscopes can be classified under two types

CONVENTIONAL LIGHT LARYNGOSCOPES:- Blades have its lamp near the blade distal end and have an electrical connection to illuminate the lamp, powered by batteries in handle.

Example includes :

- Macintosh type laryngoscopes (curved blades)
- Miller type laryngoscopes and other straight blade designs
- McCoy laryngoscope and variants (articulating tip)

FIBRE OPTIC LIGHT LARYNGOSCOPES[10] :- Advancement in newer lighting technologies eliminated electric wires, lamps & contacts from blade thus producing a very dependable, cold and brighter illumination. Now LED / XENON lamps that produce excellent light, which follows a quartz glass fibre optic bundle or plastic bundle along the blade to illuminate a patient's oral cavity are used.

. Laryngoscopes using fibre optic principle include :

- **Rigid Fiberoptic Laryngoscopes**
  - Bullard laryngoscope

- Upsher laryngoscope
- Wu laryngoscope (WuScope)

- **Video Laryngoscopes (with microminiature TV camera)**
- **Flexible Fiberoptic Laryngoscopes (Bronchoscopes)**

HISTORY OF LARYNGOSCOPES[11]

The history of the laryngoscope can be traced to the middle of the eighteenth century; it is only since the early decades of the twentieth century that visualization of the vocal cords has been important in anaesthesia.

- Vesalius in 1543 reported the first tracheal intubation in an animal.
- First laryngoscope was invented in 1854 by Manuel Patricio Rodríguez García.
- In the early 1870's, Trendelenburg from Germany performed the first endotracheal anesthesia in man.
- In 1913 the first anaesthetic laryngoscope was invented by Jackson.
- Modern day laryngoscope systems began in early 1940s .
- In 1942, curare was introduced as a muscle relaxant for abdominal relaxation during general anaesthesia and endotracheal intubation became routine in major abdominal and other surgeries.

- In 1941, Robert Miller designed a blade with a curve on the bottom and a curved distal tip, which is now known as the Miller blade.
- Robert Macintosh designed a blade with a continuous curve in 1943. The added curve was designed to lessen the chance that there would be damage to the patient's upper teeth.
- Modifications over the years have been made to both blades for the purpose of providing more optimal intubating conditions.
- The camera screen straight video laryngoscope was invented by Dr. Jon Berall, NYC Internist and Emergency Medicine Physician, U.S. patent granted in October, 1998.
- The first successful design of a video laryngoscope was presented to market as the Glidescope Video laryngoscope in 2001 by Dr. John Pacey, a Vancouver Vascular and General surgeon.

DESCRIPTION OF MACINTOSH LARYNGOSCOPE[12] :

Macintosh laryngoscope consists of a handle and detachable blade. The light source is energised when the blade and handle are locked in the working position.

Handle :

The handle provides the power source for light. A hook on hinge folding connection between the handle and the blade is most commonly used. The handle is fitted with a hinge pin that fits a slot on the base of the blade. This allows quick and easy attachment and detachment. Handles have a metallic contact, which completes an electrical circuit when the handle and blade are in working position.

Blade :

The blade is the rigid component that is inserted into the mouth. The blade is composed of base, heel, tongue, flange, web, tip and light source. The tongue or spatula is the main shaft. It has smooth, gentle curve that extends to the tip. It serves to compress and manipulate the soft tissues especially the tongue and lower jaw. The flange projects off the side of the tongue and is connected to it by the web. It serves to guide instrumentation and deflect tissues out of the line of vision. The flange determines the cross sectional shape. In Macintosh blade the cross section forms a reverse Z. The tip or beak

contacts vallecula and helps to elevate the epiglottis. It is usually blunt to decrease trauma. In Macintosh blade bulb or fibre optic light source can be connected.

INTUBATION WITH MACINTOSH LARYNGOSCOPE[13] :

Proper preparation should include airway assessment, assembling and checking airway equipments and finally achieving sniffing position. Positioning the height of the table at the level of laryngoscopist naval helps to achieve a straight line between the operator's eye and the patient's upper airway.

The Macintosh blade should be held with the left hand at the junction of the handle and blade, while the right thumb and index finger open the mouth. Laryngoscope blade should be introduced from the right side of the patient's mouth without engaging lips and teeth. When half of the blade is introduced tongue should be swept to the left as laryngoscope blade is moved to the centre.

On deeper entry into the oral cavity, the blade tip is positioned between the base of the tongue and the pharyngeal surface of the epiglottis (vallecula) . at the stage the tongue and pharyngeal soft tissues are lifted to expose the glottis opening,.

DESCRIPTION OF THE VIDEO LARYNGOSCOPE[14] :

The Video laryngoscope is a rigid indirect video laryngoscope with integrated tube guidance. It is a self-contained device powered by an alkaline

battery included in the laryngoscope handle. The core of the laryngoscope blade is the high-intensity light emitting diode fibre and a small digital camera at the distal end.

The miniaturized colour liquid crystal display screen mounted on the proximal end of the laryngoscope handle is movable and allows viewing of anatomical structures and the tracheal intubation process. The operator can perform intubation while watching the LCD monitor. The built-in monitor screen has a wide viewing angle and is readily visible from behind and from the side of the airway scope, allowing staff other than the operator to verify the tracheal intubation status. In addition, the airway scope's video output allows a group of people to view the images on an external medical monitor. The video monitor allows simple yet accurate verification during tracheal intubation procedures.

The scope is paired with an Interlock blade with curved shape. The blade accepts endotracheal tubes with outside diameters between 8.5 mm and 11.0 mm.

VIDEO LARYNGOSCOPY [15] ***:***

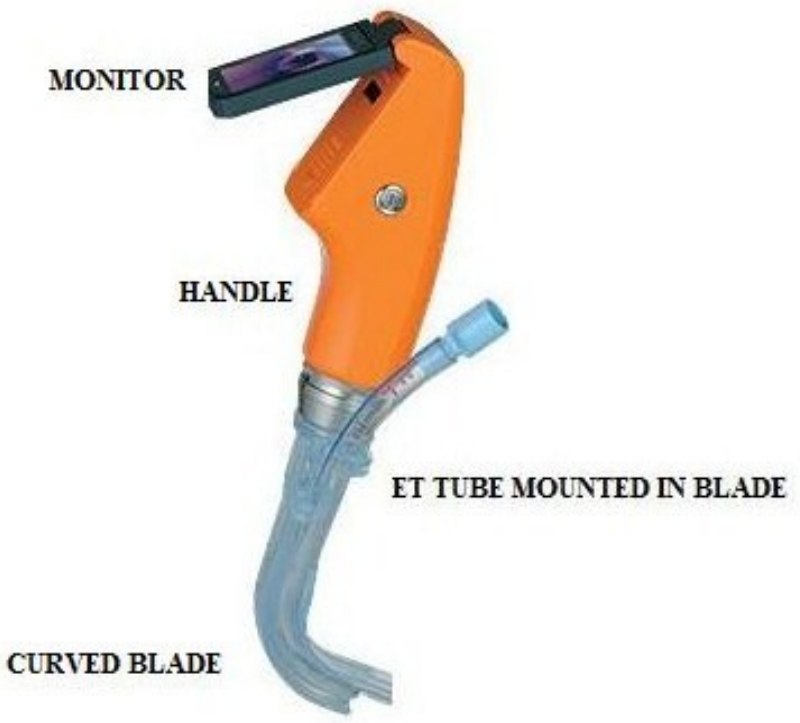
The Video scope is inserted in the midline into the oral cavity. Identification of the uvula centred on the display screen used as the first landmark to ensure that the blade was in the midline and correctly orientated. The blade was then slide around the tongue into the posterior pharynx; optimum

depth of insertion was determined by the vallecula. The blade was slightly elevated against the dorsal face of the tongue with minimum upward pressure for indirectly lifting the epiglottis.

The angle of the built-in monitor screen can be adjusted for easier viewing.

Intubation can be completed by aligning the pointer shown on the monitor with the intubating position and gently pushing the endotracheal tube along the Interlock's guides. No stylet is needed. The blade incorporating with a channel for a suction catheter, permitting aspiration treatment inside the oral cavity if required.

VIDEO LARYNGOSCOPE



MACINTOSH LARYNGOSCOPE

REVIEW OF LITERATURE

The literature was searched and reviewed to seek advantages and the problem related to video aided intubation techniques.

1. **Ishwar singh, Abhijit khaund, Abhishek gupta, Department of Anaesthesiology,Jaipur Golden Hospital, New Delhi,** conducted study on 'Evaluation of true view Laryngoscope in anticipated difficult intubation a comparision to Macintosh Laryngoscope in fifty cases. Trueview improved laryngeal view in 92% cases by one or more C&L grade. Intubation with Trueview was possible in 88% of cases within stipulated time of one minute and mean time of 28.6 seconds. No significant complication like oro-pharyngeal

trauma or extreme pressor response was noted and concluded that Trueview provided better tool than conventional laryngoscope in anticipated difficult intubation.

2. **Stroumpolis K PagoulatouA, Violary M et al**. – Videolaryngoscopy in the management of difficult airway: a comparison with Macintosh blade.

This study included 112 patients with an estimated difficult intubation. The percentage of Cormack & Lehane I & II views obtained by conventional laryngoscopy rose from 63.4 to 90.2 % with video laryngoscopy. Cormack & Lehane III & IV grades decline from 36.6 to 9.8 % of the cases. This study concluded that in patients with an anticipated difficult airway videolaryngoscopy significantly improved the laryngeal exposure thus facilitating endotracheal intubation.

3. **Marshal B Kaplan, MD, Denham S Ward, MD, George Berci, MD** conducted study on video laryngoscope aided intubation in 235 patients.

Patients studied were divided into two groups: Group A (n = 217), in whom intubation was thought unlikely to be difficult, and Group B (n = 18), in whom difficulty with intubation was anticipated. External laryngeal manipulation (ELM) was required in 22 of the 217 Group A patients (10%). All intubations but one in this group were successful. In the second group (B) of 18 patients who had anatomical conditions that suggested that direct laryngoscopy

might be challenging, all 18 cases required ELM but all were successfully intubated using the VMS.

4. Comparison of tracheal intubation using the Airtraq or the Macintosh laryngoscope in routine airway management: a randomised, controlled clinical trial was conducted by **C. H. Maharaj, D. O'Croinin, G. Curley, B. H. Harte and J. G. Laffey.**

Sixty consenting patients presenting for surgery requiring tracheal intubation were randomly allocated to undergo intubation using a Macintosh or Airtraq laryngoscope. All patients were intubated by one of four anaesthetists experienced in the use of both laryngoscopes. No significant differences in demographic or airway variables were observed between the groups.

There was no difference between groups in the duration of intubation attempts. In comparison to the Macintosh laryngoscope, the Airtraq resulted in modest improvements in the intubation difficulty score, and in ease of use. Tracheal intubation with the Airtraq resulted in less alterations in heart rate. These findings demonstrate the utility of the Airtraq laryngoscope for tracheal intubation in low risk patients.

5. An evaluation of the GlideScope, a new video laryngoscope for difficult airways - **Author(s) : BENJAMIN F. J. ; BOON D. ; FRENCH R.**

The scenarios were: 'normal', pharyngeal obstruction, cervical rigidity and tongue oedema. Thirty anaesthetists from the Christchurch Anaesthetic Department attempted to pass a bougie or stylet through the vocal cords of the manikin with a size 3 Macintosh blade, then the GlideScope. Forty three percent ($P = 0.02$) found an improved view with the GlideScope in the pharyngeal obstruction scenario. Reportage of ease of intubation showed no statistical difference in any scenarios. However, 93% of anaesthetists considered having the GlideScope would be useful if faced clinically with one or more of the studied scenarios. The GlideScope improved the view in one of three difficult airway situations when used by anaesthetists with no formal training in its use. we consider that the GlideScope is a useful addition to the range of difficult airway devices available.

6. Comparison of the GlideScope video laryngoscope and Macintosh laryngoscope in simulated tracheal intubation scenarios. **H J Kim, S P Chung, I C Park, J Cho, H S Lee, Y S Park** ,Department of Emergency Medicine, Yonsei University College of Medicine, Seoul, Republic of Korea

All 25 participants successfully completed the study. There was no difference in the time required for successful tracheal intubation using the GVL compared with using the Macintosh laryngoscope in the four airway scenarios. Only one participant failed to intubate the trachea with the Macintosh laryngoscope for the combined scenario. There was a significant increase in

POGO when using the GVL in the cervical spine immobilisation group (p = 0.027). The VAS score of the subjective ease of intubation was lower for the GVL than for the Macintosh laryngoscope device in difficult scenarios but this difference was not significant. This study suggests that the GVL could be an option for airway management even by emergency physicians with little experience and no training in its use.

7. GlideScope video laryngoscope: a randomized clinical trial in 203 paediatric patients - **J.-T. Kim, H.-S. Na, J.-Y. Bae, D.-W. Kim, H.-S. Kim*, C. S. Kim and S. D. Kim** , Department of Anesthesiology and Pain Medicine, Seoul National University Hospital, Seoul 110-744, Korea

The laryngoscopic view in 203 children was scored using both the Macintosh laryngoscope and the GlideScope using Cormack and Lehane (C&L) grades. The trachea was intubated using direct laryngoscopy (Group DL, n=100) or the GlideScope (Group GS, n=103) C&L grades compared and also the time to intubate for each group.

The GlideScope improved the view without BURP in the patients with C&L grade 2 (16/26, P<0.01) and with C&L grades 3 and 4 (7/11, P<0.05). The view with BURP was also improved by the GlideScope® in C&L grade 2 (4/9, P<0.05) and with C&L grades 3 and 4 (4/5, P=0.059). The mean time for tracheal intubation was 36.0 (17.9) s in the GS group and 23.8 (13.9) s in the DL group (P<0.001).

In children, the GlideScope provided a laryngoscopic view equal to or better than that of direct laryngoscopy but required a longer time for intubation.

8. The GlideScope Video Laryngoscope: randomized clinical trial in 200 patients - **Sun, D. A.; Warriner, C. B.1; Parsons, D. G.; Klein, R.; Umedaly, H. S.; Moult, M.**

Two hundred patients were randomly assigned to intubation by direct laryngoscopy using a Macintosh size 3 blade (DL, n=100) or intubation using the GlideScope (GS, n=100). The patient was then intubated, using direct laryngoscopy or the GlideScope, the larynx was inspected and given a laryngoscopy score. Time to intubate was measured. In the GS group, laryngoscopy grade was improved in the majority (28/41) of patients with C&L grade >1 and in all but one of patients who were grade 3 laryngoscopy (P<0.001). The overall mean time to intubate was 30 (95% CI 28–33) s in the DL group and 46 (95% CI 43–49) s in the GS group. The time to intubate for C&L grade 3 was similar in both groups, being 47 s for the DL group and 50 s for the GS group respectively.

9. Evaluation of Portable Video Laryngoscope for Orotracheal Intubation

- Zadrobilek E, Krasser K, Missaghi SM, Moser A, Lackner-Ausserhofer

Over a study period of 3 months, adult patients with ASA physical status classification 1, 2, or 3 requiring oro tracheal intubation for elective thyroid

surgery were investigated. Patients with previously experienced difficult conventional tracheal intubation, anatomic features predictive for difficult conventional laryngoscopy and tracheal intubation [such as limited mouth opening (but not less than 20 mm), restrictions in forward movement of the jaw, reduced thyromental distance, and/or limitations in head and neck movement], and/or obesity were given preferential enrollment into the study.

The operators were experienced users of the various systems and models of the GlideScope Video Laryngoscope. The study design provided successful GVL -assisted laryngoscopies and tracheal intubations on a maximum of 200 patients.

10. The Pentax- rigid indirect video laryngoscope: clinical assessment of performance in 320 cases - **A. Suzuki , Y. Toyama , N. Katsumi, T. Unisawa, R. Sasaki, K. Hirota**

Forty-six patients (14%) who were classified as Cormack Lehane glottic view grade 3 or 4 using the Macintosh laryngoscope were classified as grade 1 (45 cases) or 2a (1 case) using the Pentax-AWS airway scope. Laryngeal views measured by percentage of glottic opening score were improved significantly using the Pentax-AWS. Intubation using the Pentax-AWS was successful in all cases, 96% at the first and 4% at the second attempt. The mean (SD) time required to place the tracheal tube was 20 (10) s. The Cormack Lehane grade obtained with the Macintosh blade did not affect the total time to correctly

position the tube using the Pentax-AWS. Intubation difficulty scale (score = 0 in 305 patients, score = 1 in 14 and score = 2 in one patient) indicates that tracheal intubation was performed easily in most cases.

The Pentax-AWS not only improves the laryngeal view, but its tube guide also facilitates rapid, easy and reliable tracheal intubation under vision. It can be useful in routine anesthesia care and may be advantageous in the situation of unanticipated difficult intubation.

11. Pentax-AWS, a new videolaryngoscope, is more effective than the Macintosh laryngoscope for tracheal intubation in patients with restricted neck movements: a randomized comparative study.

Enomoto Y, Asai T, Arai T, Kamishima K, Okuda Y. Department of Anaesthesiology, Koshigaya Hospital, Dokkyo Medical University, Koshigaya City, Saitama, Japan.

203 anaesthetized patients with manual in-line neck stabilization, were inserted the Pentax-AWS and a Macintosh laryngoscope, in turn, and recorded the view of the glottis and time taken to laryngoscopy. The success rate of tracheal intubation (within 120 s) and time to intubation were also recorded. The view of the glottis was significantly better with the Pentax-AWS than with the Macintosh laryngoscope ($P<0.001$). For the Macintosh laryngoscope, the view was obscured in 22 of 203 patients (11%) (Grade 3 in 21 patients and

Grade 4 in one patient), whereas for the Pentax-AWS, the glottis was always clearly seen (Grade 1). The success rate of tracheal intubation with the Pentax-AWS (all of 99 patients) was significantly higher than with the Macintosh laryngoscope (93 of 104 patients) (P=0.001). Time taken for intubation was similar between the Macintosh laryngoscope [51 (27) s] and the Pentax-AWS [54 (14) s] (95% CI for difference: -9 to 3 s). This study was concluded as 'In patients with stabilized neck, the Pentax-AWS provided a better view of the glottis and a higher success rate of tracheal intubation, compared with the conventional Macintosh laryngoscope'.

12.Comparison of Macintosh, Truview EVO2, Glidescope, and Airwayscope laryngoscope use in patients with cervical spine immobilization.

Malik MA, Maharaj CH, Harte BH, Laffey JG. - Department of Anaesthesia, Clinical Sciences Institute, Galway University Hospitals, Galway, Ireland.

The purpose of this study was to evaluate the effectiveness of the Pentax AWS, Glidescope, and the Truview EVO2, in comparison with the Macintosh laryngoscope, when performing tracheal intubation in patients with neck immobilization using manual in-line axial cervical spine stabilization. One hundred and twenty consenting patients presenting for surgery requiring tracheal intubation were randomly assigned to undergo intubation using a Macintosh , Glidescope , Truview EVO2 , or AWS laryngoscope. All patients

were intubated by one of the three anaesthetists experienced in the use of each laryngoscope. The Glidescope, AWS, and Truview EVO2 each reduced the intubation difficulty score (IDS), improved the Cormack and Lehane glottic view, and reduced the need for optimization manoeuvres, compared with the Macintosh. The mean IDS was significantly lower with the Glidescope and AWS compared with the Truview EVO2 device, and the IDS was lowest with the AWS. There were no differences in success rates between the devices tested. The study was concluded as The Glidescope and AWS laryngoscopes required more time, but reduced intubation difficulty and improved glottic view over the Macintosh laryngoscope more than the Truview EVO2 laryngoscope when used in patients undergoing cervical spine immobilization.

13. Comparison of the Glidescope and Pentax AWS laryngoscopes to the Macintosh laryngoscope for use by advanced paramedics in easy and difficult intubation. Authors - **Nasim S, Maharaj CH, Malik MA, O' Donnell J, Higgins BD, Laffey JG**. Department of Anaesthesia, Galway University Hospitals, Galway, Ireland.

This study compared the efficacy of these devices to the Macintosh laryngoscope when used by 25 Advanced Paramedics proficient in direct laryngoscopy, in a randomized, controlled, study. Following brief didactic instruction with the Glidescope and the AWS laryngoscopes, each participant took turns performing laryngoscopy and intubation with each device. Both the

Glidescope and the AWS performed better than the Macintosh, and demonstrate considerable promise in this context. The AWS had the least number of dental compressions in all three scenarios, and in the cervical spine immobilization scenario it required fewer maneuvers to optimize the view of the glottis. This study was concluded as The Glidescope and AWS devices possess advantages over the conventional Macintosh laryngoscope when used by Advanced Paramedics in normal and simulated difficult intubation scenarios in this manikin study.

14. Comparison of the Glidescope, the Pentax AWS, and the Truview EVO2 with the Macintosh laryngoscope in experienced anaesthetists: a manikin study.

Malik MA, O'Donoghue C, Carney J, Maharaj CH, Harte BH,

Department of Anaesthesia, Galway University Hospitals, Galway, Ireland.

Thirty-five experienced anaesthetists were allowed up to three attempts to intubate in each of four laryngoscopy scenarios in a Laerdal SimMan manikin. The time required to perform tracheal intubation, the success rate, number of intubation attempts and of optimization manoeuvres, and the severity of dental compression were recorded. In more difficult tracheal intubation scenarios, the Glidescope and Pentax AWS, and to a lesser extent the Truview EVO2 laryngoscope demonstrated advantages over the Macintosh laryngoscope including a better view of the glottis, greater success of tracheal intubation, and

ease of device use. The Pentax AWS was more successful in achieving tracheal intubation, required less time to successfully perform tracheal intubation, caused less dental trauma, and was considered by the anaesthetists to be easier to use.

15.The Efficacy of the Storz Miller 1 Video Laryngoscope in a Simulated Infant Difficult Intubation

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Thirty-two attending paediatric anaesthesiologists attempted tracheal intubation of the infant manikin using VL and DL in randomized order. The best laryngeal view with each laryngoscope and time to intubation were documented. There was a significant difference in the distributions of laryngoscopy grades between VL and DL ($P < 0.001$), with the VL giving a better laryngeal view. Forty percent of anaesthesiologists reported a Grade 3 or 4 view with DL; all of which were converted to Grades 1 and 2 with VL. The median grade with interquartile range was two (2-3) for DL and one (1-2) for VL ($P < 0.001$). Seventy-eight percent of participants reported an improvement of at least one grade in laryngeal view with VL compared with DL. There were

two failed intubations using DL and none using VL. Time to intubation was similar between the two techniques.

This study was concluded as ‘The Storz Miller 1 VL blade improved glottic exposure in a simulated difficult laryngoscopy compared with direct laryngoscopy with a standard Miller 1 blade without increasing the time to intubation,.

AIM OF THE STUDY

To compare intubating conditions with video laryngoscope, & macintosh laryngoscope in respect to

- Advantages and safety
- Effective intubation time
- Airway trauma

METHODOLOGY

It was a prospective, randomised, case- controlled, cross over study conducted in Department of Anaesthesiology, Madras Medical College- GGH.

250 adult patients satisfying inclusion criteria were enrolled in this study.

INCLUSION CRITERIA:

- Elective adult surgical patient requiring general endotracheal anaesthesia.
- Males and Females.
- ASA Physical Status 1-2.
- Age 18 years of age and older.

EXCLUSION CRITERIA:

- Not satisfying inclusion criteria.
- Patients requiring special techniques for intubation such as rapid sequence induction.
- Intubated prior to surgery.
- Severe cardiovascular, hepatic or renal disease, mental illness.
- Are unconscious or very severely ill.
- Need for nasal intubation.

MATERIALS:

- Macintosh laryngoscope - current standard Device.
- Video Laryngoscope Device: Used during laryngoscopy to facilitate intubation.
- Weighing machine calibrated to 1 Kg.
- Measuring tape calibrated to 0.5 cm.
- Goniometer

AIRWAY ASSESSMENT[16]

Previous anaesthesia records, H/O snoring, H/O voice change, H/O previous surgery, Trauma, Burns, Tumour in & around the oral cavity, Neck or cervical spine were asked in the history.

H/O of systemic illness like Diabetes, Ankylosing spondylitis, Rheumatoid arthritis were asked and recorded.

General examination included examination for facial anomalies, Tempero-mandibular joint pathology, Anomalies of mouth & tongue, pathology of nose, pathology of palate.

Height in metre and weight in kilograms were recorded and BMI calculated.

Individual airway indices were measured.

A-O joint movement : Patient was asked to look the ceiling without raising eyebrow and the range of movements measured with gonioscope.

Neck flexion : Patient was asked to touch the manubrium sterni with chin and the range of movements measured with gonioscope.

TMJ function : the patient was asked to open his mouth wide open and the inter incisor distance measured. Examiners index finger was placed in front of the tragus and thumb over the mastoid process- the patient was asked to open the jaw and sliding function of the mandibular condyle was assessed.

Upper lip bite test : the patient was asked to bite the upper lip with the lower incisor and graded as follows :

Class 1 : lower incisor can bite the upper lip above the vermilion line.

Class 2 : lower incisor can bite the upper lip below the vermilion line.

Class 1 : lower incisor cannot bite the upper lip.

Thyromental distance: distance between the thyroid notch and mental symphysis when the neck was fully extended and mouth closed.

Sternomental distance: distance between the sterna notch and mental symphysis when the neck was fully extended and mouth closed.

Neck circumference: measured in cm at the level of thyroid notch.

Examination of dentures:

Abnormalities like cracking, bucking, loose, artificial and absence of incisors were examined and recorded.

Samsoon & young modification of Mallampati grading [17] :

The patient kept in sitting position with maximal mouth opening, protruding tongue, without phonation and the observer's eye in level with patients mouth the degree to which faucial pillars, uvula, soft palate & hard palate were visible were recorded and classified as follows:

Grade I : faucial pillars, uvula, soft palate & hard palate visible

Grade II : uvula, soft palate & hard palate visible

Grade III : base of uvula or none , soft palate & hard palate visible

Grade IV : only hard palate visible

After assessment patient shifted to operating room.

I.V line started and monitors connected.

Video laryngoscope checked for battery power and monitor resolution.

Appropriate size endotracheal tube for the patient selected.

Water soluble lubricating jelly applied to the endotracheal tube and positioned in the curved interlock blade.

External monitor was also powered on and connected to video laryngoscope.

Inj.Glucopyrrolate 0.2mg and Inj. Fentanyl 2µg/Kg given as premedication.

Then pre-oxygenated with 100% oxygen 6ltr/min for 3 min .

Induction done with inj. Thiopentone 5mg /kg + NDP neuromuscular blocker + inj. Xylocard1.5 mg /kg

Ventilated with face mask for 3 min.

Quick look laryngoscopy done with Macintosh laryngoscope

Cook's modification of Cormack-Lehane grading was noted.

Intubation attempted with Video laryngoscope.

Cook's modification of Cormack-Lehane grading and Intubation difficulty score were noted as follows:

CORMACK & LEHANE GRADING SYSTEM [18] :

Entire vocal cord visualized	– Grade-I
Posterior part of vocal cords seen	– Grade IIa
Arytenoids only seen	– Grade IIb
Epiglottis only seen (liftable)	– Grade IIIa
Tip of epiglottis only seen / adherent	– Grade IIIb
No glottis structure seen	– Grade IV

INTUBATION DIFFICULTY SCORE [19] :

Seven variables are used :

- N1 - Number of supplementary attempts. An attempt is defined as one advancement of tracheal tube in the direction of the glottis during direct laryngoscopy.
- N2 – The number of supplementary operators directly attempting (not assisting)
- N3 – The number of alternative techniques used.
- N4 – Glottic exposure as defined by the Cormack grade minus one.

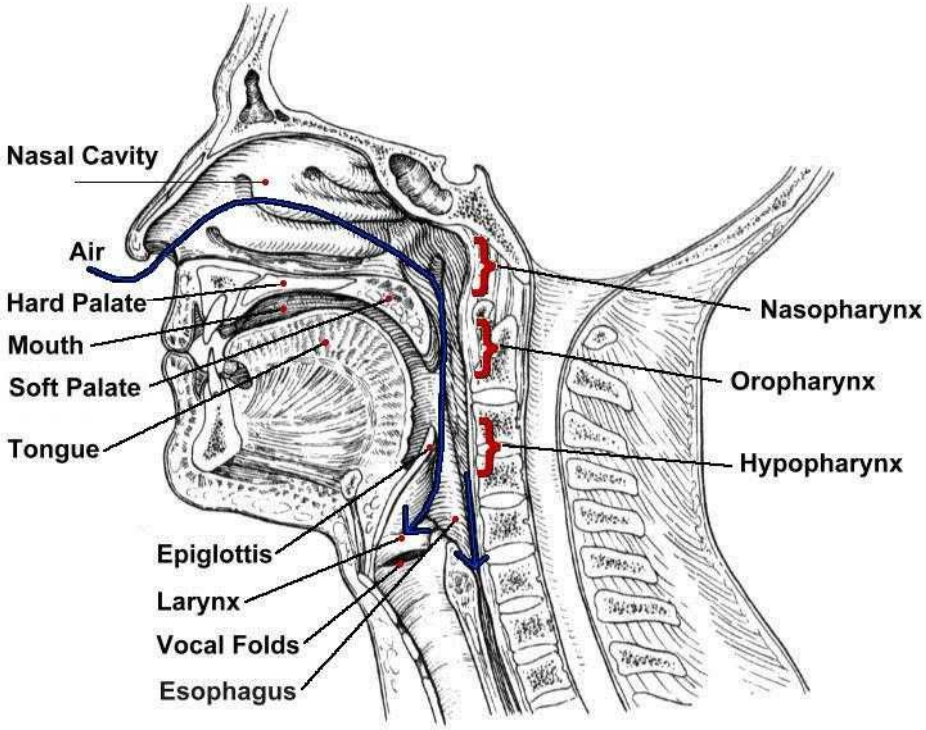
- N5 – subjectively increased lifting force applied during laryngoscopy.
- N6 – The necessity of external laryngeal pressure.
- N7 – Position of vocal cords. 0- abduction, 1- adduction

If the intubation attempt with video laryngoscope failed and saturation maintained Macintosh blade used for intubation and if the saturation decreased mask ventilation with 100% oxygen followed by intubation with Macintosh blade.

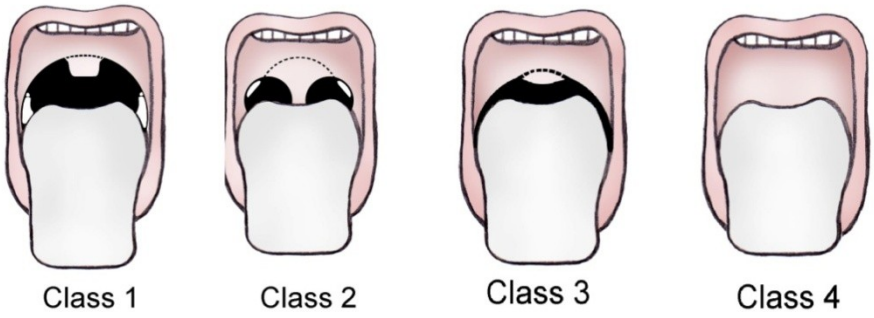
Apart from Cormack-Lehane and Intubation Difficulty score the following factors were also noted :

- Intubation time: Measured from entry of the device into the oral cavity until confirmation of proper placement of tracheal tube.
- Complication Rate: All complications will be recorded, with special attention given to common complications, such as upper airway and dental trauma.

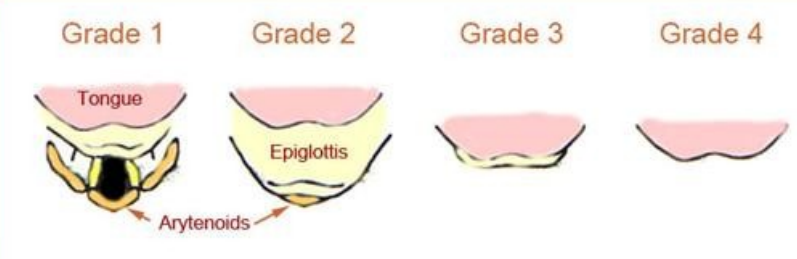
ANATOMY OF UPPER AIRWAY



MODIFIED MALLAMPATI CLASSIFICATION



CORMACK & LEHANE GRADING OF LARYNGEAL VIEW



OBSERVATION AND RESULTS

This prospective, randomized, single blinded (subject), case control-cross over study compared the intubating conditions with video laryngoscope and Macintosh laryngoscope and evaluated the advantages and safety, effective airway time, airway trauma and hemodynamic response .

All data were collected and tabulated.

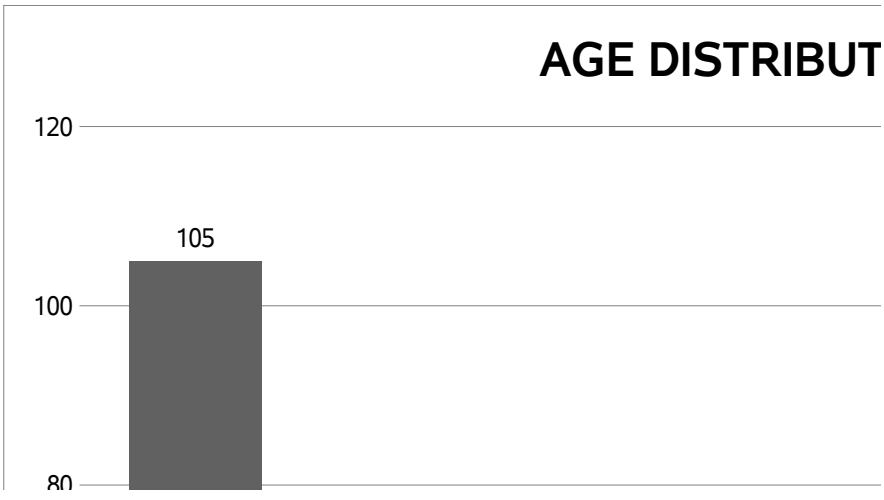
DEMOGRAPHIC VARIABLES :

250 patients were randomly selected and included in this study.

Age distribution :

Age group of the patients range from 18 yrs to 82 yrs. Majority of the study population were in 18 to 30 yrs age group

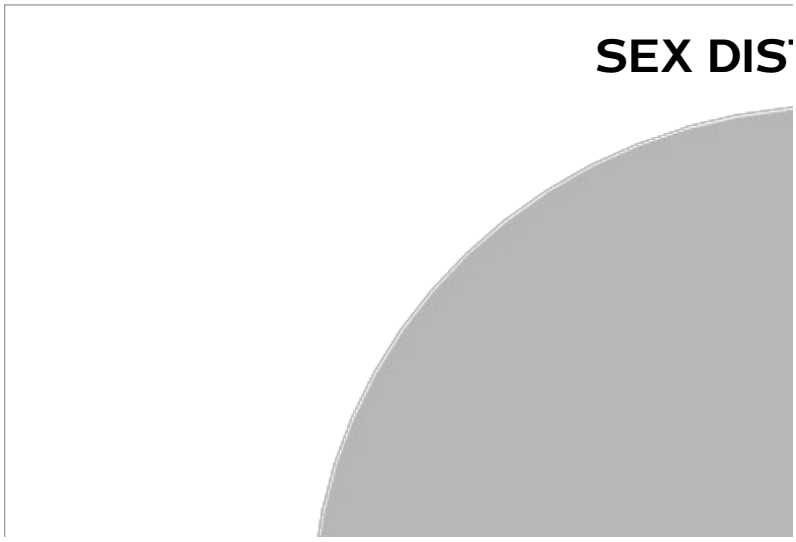
AGE (yrs)	18-30	31-40	41-50	51-60	61-70	> 71
N	105	67	43	23	10	2



Sex distribution :

- Among the study population 51% were male and 49% were female.

SEX	MALE	FEMALE
n	122	128
%	51	49



AIRWAY EXAMINATION :

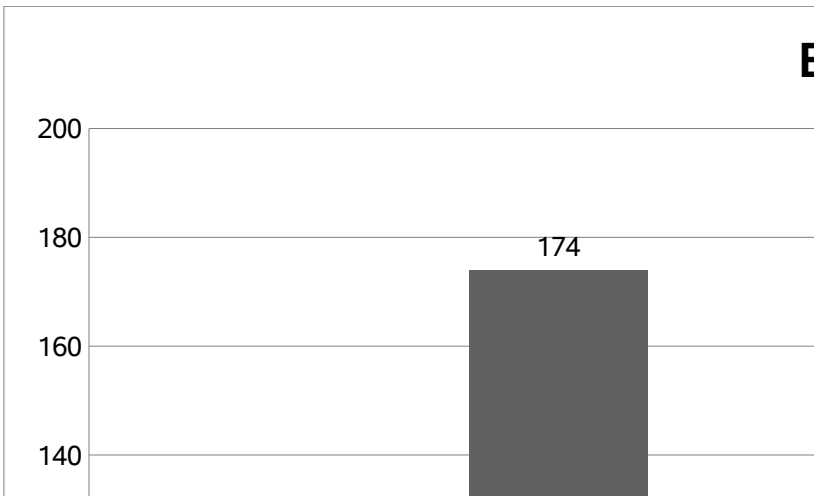
- Neck flexion ranged from 10^0 to 35^0. Neck extension ranged from 0^0 to 45^0. In 4 patients neck movements not assessed due to post burn contractures.

- Sterno mental and thyromental distances ranged from 13 to 22 cm and 8 to 11 cm respectively.
- Inter incisor distance ranged from 2 to 5.5 cm.
- Neck circumference ranged from 35 to 45 cm.
- 8 patients had artificial dentures, 19 patients had buck tooth, 12 had loose tooth, and 9 patients were edentulous.
- In upper lip bite test 152 patients were score 1, 53 patients score 2 & 45 patients score 3.
- Body mass index of the patients ranged from 18 to 35.

BODY MASS INDEX :

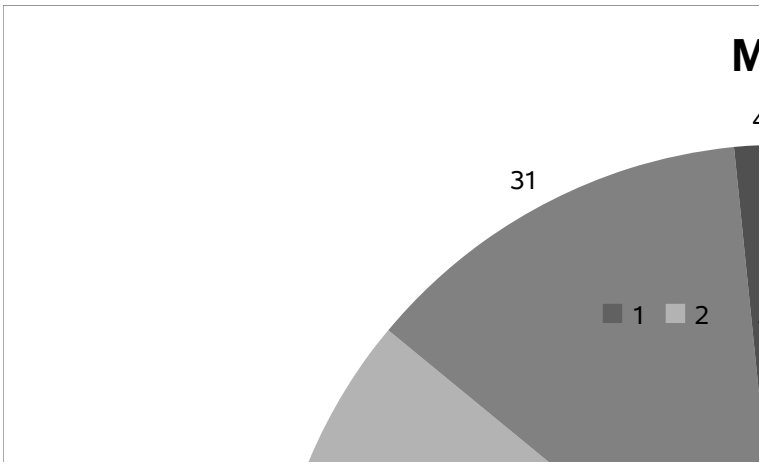
BMI	≤ 20	21-25	26-30	31-35	≥ 35
n	14	174	47	14	1

RANGE	18 - 35



- Modified Mallampati score distribution was 60% / 26% / 12.4% / 1.6%.

MMC	1	2	3	4
n	150	65	31	4
%	60	26	12.4	1.6



OUTCOME MEASURES :

Cormack & Lehane grading :

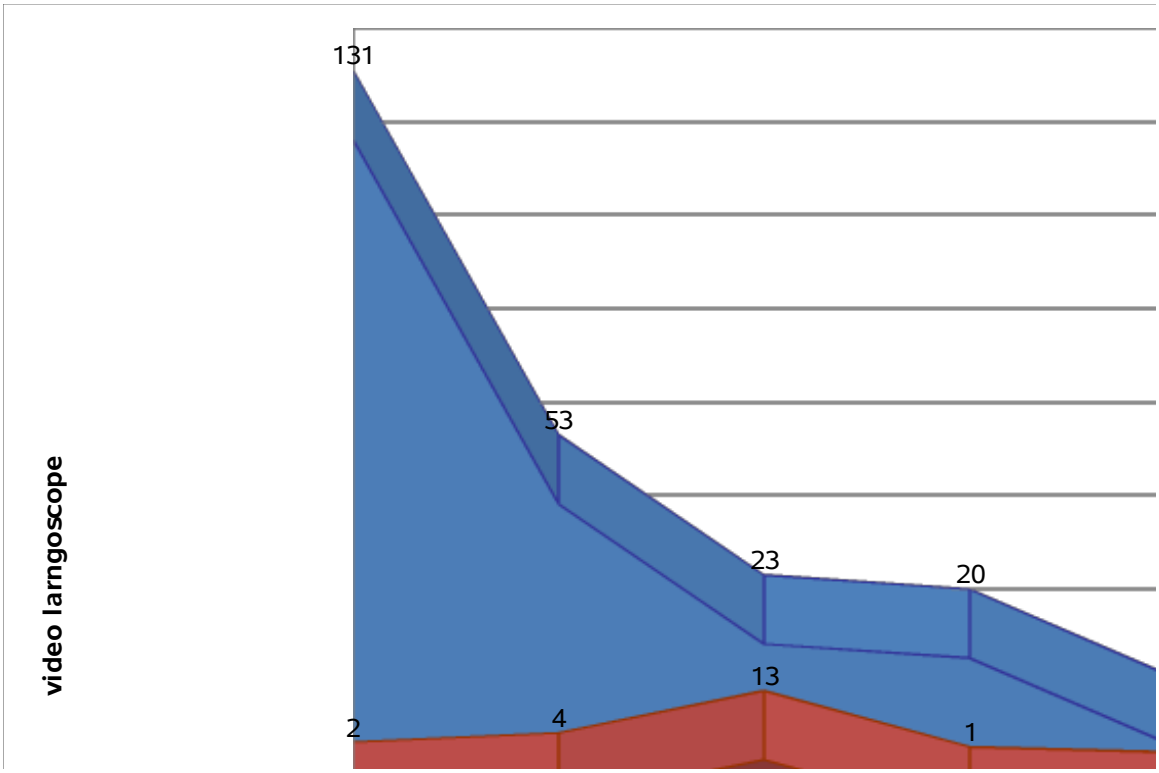
Samsoon & young modification of Cormack & Lehane classification was used to grade laryngeal view.

91% in video laryngoscope were score 1, compared to 53 % in Macintosh group.

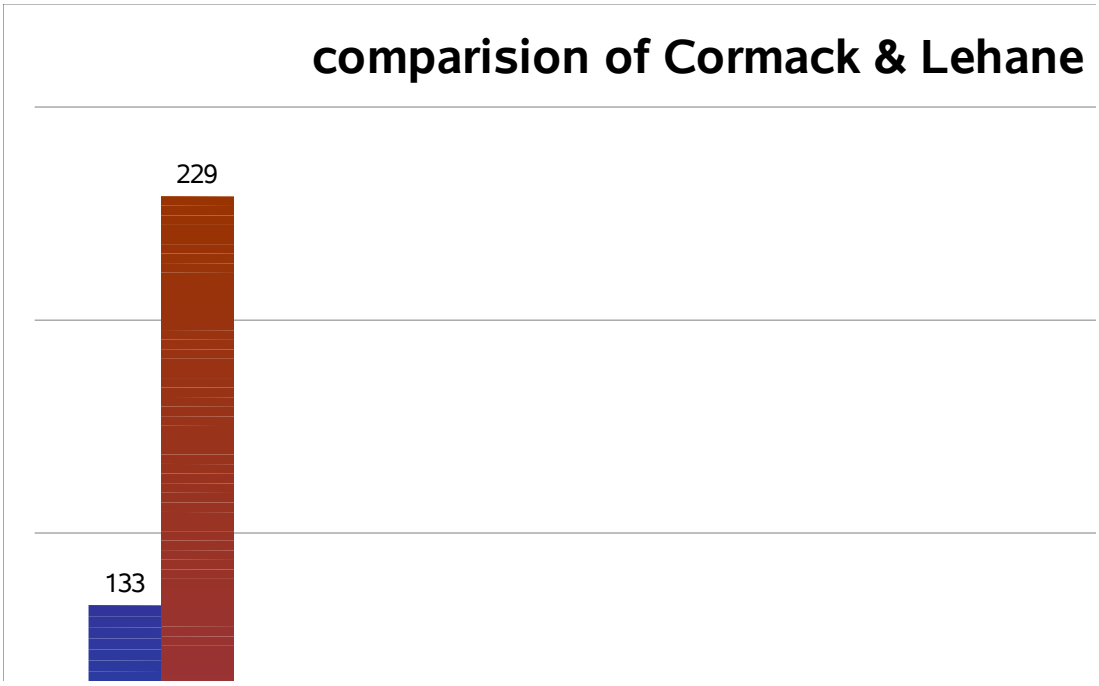
In video laryngoscope group 8% in 2a group, 0.4% in 2b group and no patients were in 3 & 4 grades.

COMPARISON OF LARYNGOSCOPIC VIEW WITH CORMACK & LEHANE GRADING

	VIDEO LARYNGOSCOPE						
MACINTOSH	*	1	2a	2b	3a	3b	4
	1	131	2	0	0	0	0
	2a	53	4	0	0	0	0
	2b	23	13	1	0	0	0
	3a	20	1	0	0	0	0
	3b	1	0	0	0	0	0
	4	1	0	0	0	0	0



Cormack & Lehane	**1**	%	**2a**	%	**2b**	%	**3a**	%	**3b**	%	**4**	%
Macintosh	**133**	53	**57**	22.8	**37**	14.8	**21**	8.4	**1**	0.4	**1**	0.4
Video scope	**229**	91	**20**	8	**1**	0.4	**0**	0	**0**	0	**0**	0



Statistical analysis were conducted using SSPC 13.0 version.

Primary outcome measures compared with

- Chi-square test
- Wilcosin rank test
- Paired t test.

Chi-square test :

	VIDEO	1	2A	2B	3A	3B	4	TOTAL	
MAC	RANKS	1	2	3	4	5	6		
1	1	131	2	0	0	0	0	133	
	Row %	98.5 %	1.5 %	-	-	-	-		
	Col %	57 .0%	10.5 %	-	-	-	-	53.2 %	
2A	2	54	4	0	0	0	0	58	
	Row %	93.1 %	6.9 %	-	-	-	-		
	Col %	23.5 %	21.1 %	-	-	-	-	23.2 %	
2B	3	23	12	1	0	0	0	36	
	Row %	63.9 %	33.3 %		-	-	-		
	Col %	10.0 %	63.2 %		-	-	-	14.4 %	
3A	4	20	1	0	0	0	0	21	
	Row %	95.6%	4.4 %	-	-	-	-		
	Col %	8.0 %	5.2 %	-	-	-	-	8.4 %	
3B	5	1	0	0	0	0	0	1	
	Row %	100 %	-	-	-	-	-		
	Col %	0.4 %	-	-	-	-	-	0.4 %	
4	6	1	0	0	0	0	0	1	
	Row%	100 %	-	-	-	-	-		
	Col %	0.4 %	-	-	-	-	-	0.4 %	
		230	19	1	0	0	0		
		92.0 %	7.6 %	0.4 %	-	-	-	250	

Chi- square (Pearson) – Value :47.945 Degree of freedom : 10

P value - .00000 ¬ < 0.001**

Inference :

Statistically significant (95% & 99% CI) improvement in laryngeal view were noted with video laryngoscope than Macintosh laryngoscope

PAIRED t TEST :

Variable	No of pairs	correction	2-tail sio	mean	Std. deviation	minimum	maximum
MACINTOSH	250	0.156	0.014	1.976	1.459	1	6
VIDEO SCOPE				1.084	0.292	1	3

Paired differences (95 % CI) :

Mean	SD	SE of mean	t-value	D.F.	2 tail sio
0.712	1.072	0.091	9.78	249	0.000

P value - .00000 ¬ < 0.001**

The improvement in laryngeal view with the use of video laryngoscope was significant when analysed with Paired t test

WILCOXON MATCHED - PAIRS SIONED - RANKS TEST :

RANKING :

Ranking was given to the Cormack & Lehane grading in the following manner. Lesser degree of rank correlates with better laryngeal view.

C&L grade	1	2a	2b	3a	3b	4
RANK	1	2	3	4	5	6

Mean rank	Rank	Cases	
57.91	Negative	112	Video < Mac
34.50	Positive	2	Video > Mac
------	Ties	136	Video = Mac
total		250	

Z= -9.0717 2 tailed P = 0.0000 (95% CI)

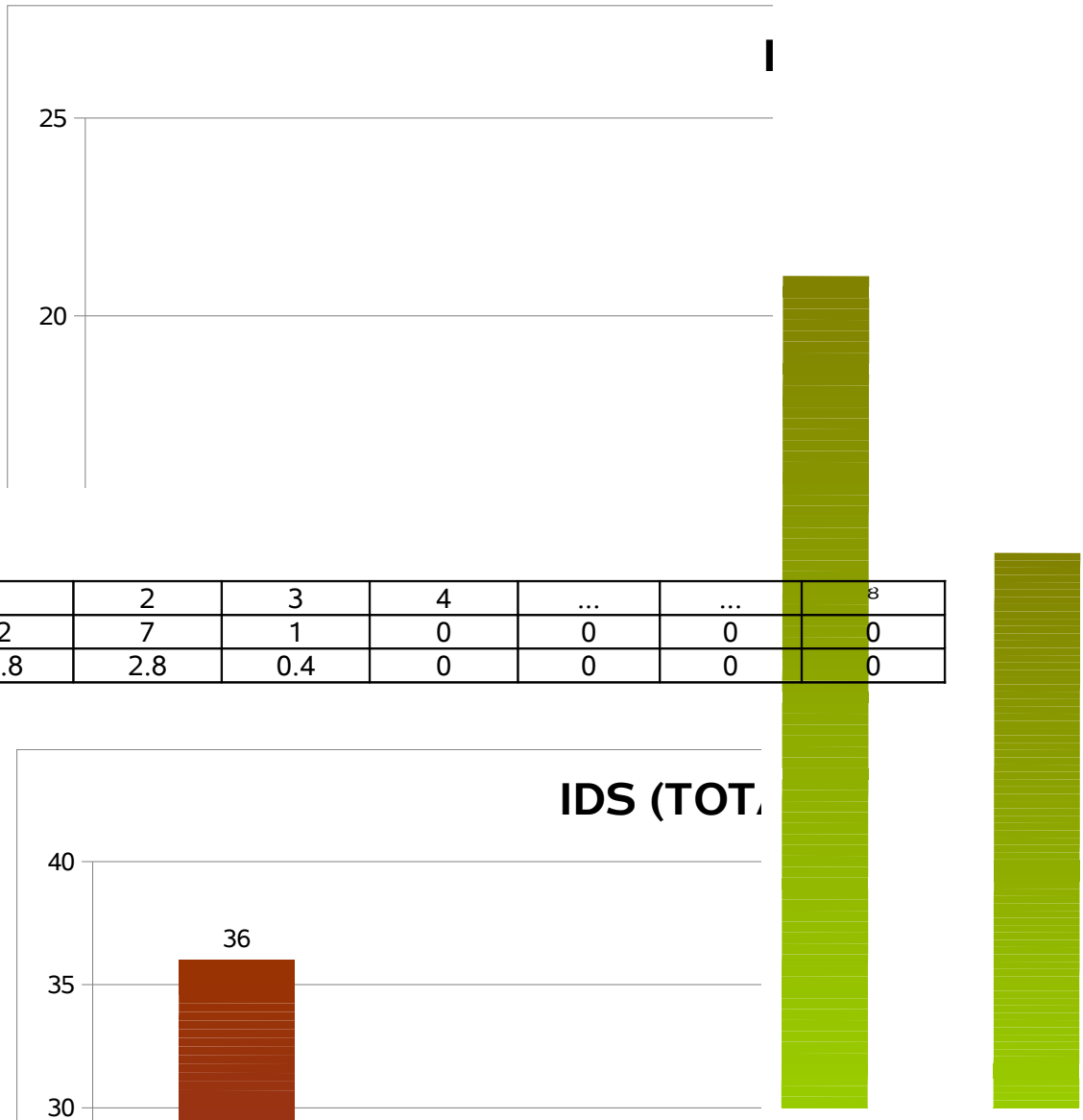
- In 136 patients the Cormack & Lehane view was same in both groups.
- In 112 patients the videoscope ranking was less than Macintosh ranking. i.e better laryngeal view in Videoscope group. This difference was analysed with Wilcoxon matched - pairs sioned - ranks test , and the improvement in laryngeal view was significant in video laryngoscope.
- In 2 patients laryngeal view was better in Macintosh group.

Intubation difficulty score :

IDS score was 1 in 12.8 %, 2 in 2.8% and 3 in 0.4 %.

The maximum score was 3.

	N 1	N 2	N 3	N 4	N 5	N 6	N 7
N	1	0	2	21	14	11	0
%	0.4	0	0.8	8.4	5.6	4.4	0

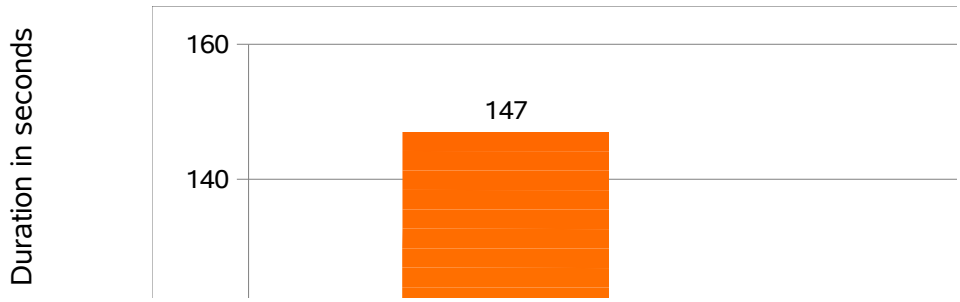


IDS	1	2	3	4	...	...	8
n	32	7	1	0	0	0	0
%	12.8	2.8	0.4	0	0	0	0

Duration :

Mean duration was 17 seconds. Range was 10 to 25 seconds. 58.8% were intubated in 10 to 15 seconds.

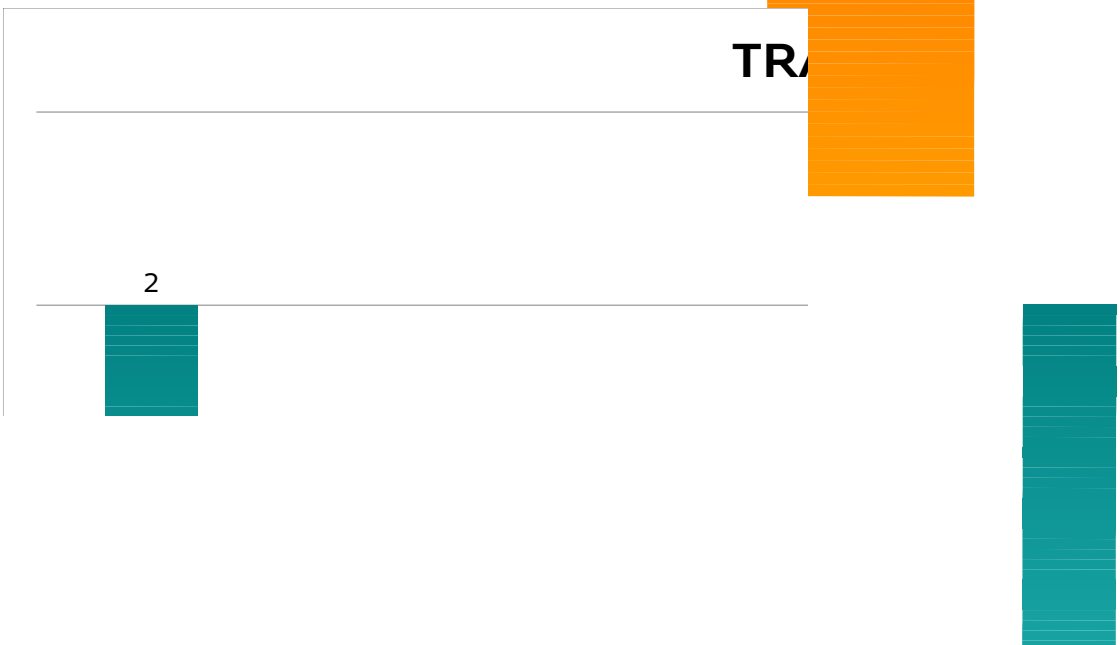
Seconds	10-15	16-20	21-25
n	147	91	12
%	58.8	36.4	4.8



Trauma:

In 5 patients minor degree of trauma noted. In 2 patients abrasion of lips , in 2 patients minor abrasion in pharynx and in 1 patients abrasion in base of epiglottis noted.

TRAUMA	LIPS	DENTURES	TONGUE	PALATE	PHARYNX	EPIGLOTTIS	LARYNX	Σ
N	2	0	0	0	2	1	0	5
%	0.8	0	0	0	0.8	0.4	0	2



DISCUSSION

Expert airway management is an essential skill of an Anaesthesiologist.

Difficulties with tracheal intubation are mostly caused by difficult direct laryngoscopy with impaired view to the vocal cords[19]. Unfortunately, despite of all the information currently available, no single factor reliably predicts these difficulties[20].

Consequently, many difficult intubations will not be recognized until after induction of anaesthesia. Unanticipated difficult intubation can lead to critical situations, especially in those patients who are at risk for gastric regurgitation, who are difficult to ventilate by mask or who have limited cardio-pulmonary reserves.

When a person is in supine position and head in neutral position the laryngeal axis is almost horizondal. The pharyngeal axis is approximately 30-45^0 from the horizondal axis and the oral axis is almost perpendicular to laryngeal axis[21].

Successful direct laryngoscopy for the exposure of the glottis opening requires the alignment of oral, pharyngeal & laryngeal axes. Elevation of head about 10 cm with pads below the occiput aligns the laryngeal & pharyngeal axes.

Subsequent head extension at the atlanto occipital joint creates the shortest distance and most nearly straight line from the incisor teeth to glottis opening.

The degree of head and neck movements that can facilitate intubation with conventional aids are [22]:

- Head extension : $> 80 – 85^0$
- Neck flexion ; $> 25 – 30^0$
- Head / neck rotation ; $> 70 – 75^0$
- Normal lateral bending movements at cervical spines include $5 – 10^0$ at each cervical spine below C2 level.

Presence of factors like Ankylosing spondylitis, Rheumatoid arthritis, Cervical spondylitis, Cervical spine fusion, Cervical spine injury, scleroderma, fibrosis of neck region due to burn will prevent ideal positioning and intubation may be difficult with conventional aids.

Many endoscopic intubation laryngoscopes such as the Bullard laryngoscope, the Upsher laryngoscope or the Wuscope have been designed to visualize the vocal cords through a proximal viewfinder that overcomes the curved anatomical axis by prism or mirror.

In recent years video assisted laryngoscopic devices have been introduced. They have been designed using fibro optic principle to provide better view of objects situated more anterior to straight line of vision. It is deemed to be useful in situations where conventional laryngoscopy fails to get desired laryngeal view. Trial reports available so far have shown improvement in laryngeal view.

The advantages of videoscope from the available literatures include [22,23,24]:

- As the axis of Laryngoscope is curved and the image is transmitted through fibro optic cable, the alignment of the axes may not be needed – improved intubating conditions in patients
- Useful when there is altered anatomy and when contra indications for Magill's positioning are present.
- The displayed anatomy is magnified.
- Recognition of the anatomical structures and anomalies is easier
- Manipulation of airway devices is facilitated.
- When assistance is required, the operator and assistant can coordinate their movements because each sees exactly the same image on the video monitor.

- Airway illumination provided by the endoscope was judged to be equal to that of a standard laryngoscope.
- The oxygen flow at the tip of the scope not only protected the lens against fogging up and secretions, but simultaneously allowed apnoic oxygenation during laryngoscopy.
- An excellent tool for demonstration, teaching and monitoring conventional laryngoscopy.
- Video-recording enables documentation and review of the intubation sequence later on.
- Video - display from the distal blade gives an better view of the cords and as the patients were intubated under monitor control without much force during laryngoscopy or head-neck manipulations.

There are also disadvantages like- Difficulty during learning curve & Difficulty in patients with limited mouth opening.

Our study was designed to compare the intubating conditions of video laryngoscope with conventionally used Macintosh laryngoscope.

250 Patients were randomly selected and patients with anticipated difficult airway were also included.

IMPROVEMENT IN LARYNGEAL VIEW :

The laryngoscopic view was graded by Cook's modification of Cormack & Lehane classification.

Cormack & Lehane score (1/2a/2b/3a/3b/4) with Macintosh blade (133/57/37/21/1/1) and with Videolaryngoscope was (229/20/1/0/0/0). The difference was statistically significant (95% & 99% CI) when analysed with Wilcoxon matched - pairs sioned - ranks test, chi square test (pearson) and paired t test.

Cormack & Lehane grading 1 was seen in 91 % of the study population which represents best intubating condition.

This result is comparable with the study conducted by Ishwar singh, Abhijit khaund, Abhishek gupta, Department of Anaesthesiology,Jaipur Golden Hospital, New Delhi, where improved laryngeal view obtained in 92% cases.

The study conducted by Y. Toyama , N. Katsumi , T. Kunisawa , R. Sasaki , K. Hirota (The Pentax- rigid indirect video laryngoscope: clinical assessment of performance in 320 cases) - 14% patients who were classified as grade 3 or 4 using the Macintosh laryngoscope were classified as grade 1 (45 cases) or 2a (1 case) using the Pentax-AWS airway scope. In our study 10%

cases who were classified as grade 3 or 4 using the Macintosh laryngoscope were classified as grade 1 (22 cases) or 2a (1 case) using the videolaryngoscope.

INTUBATION DIFFICULTY SCORE [25] :

Intubation difficulty score was used to evaluate intubating conditions. It was developed by Adnet et al in 1997. It is a blend of subjective and objective criteria that permit a qualitative and quantitative approach to the progressive nature of the difficulty in intubation, and appears to be the best indicator till date.

In this scale, the value of IDS is '0' if full visualization of the laryngeal aperture is possible during laryngoscopy and vocal cords are seen to be nicely abducted. Each variation from this defined 'ideal' intubation increases the degree of difficulty, the overall score being the sum of all variations from the definition.

It was generally easy to insert the Pentax- videoscope, to obtain a full view of the glottis, and to intubate the trachea, without major complications. In this scope, tracheal tube can be attached to the side of the blade, and the tip of the tube is already shown on the monitor display. Once the glottis was positioned in the target symbol, it was easy to advance the tube into the trachea.

In our study the following parameters were noted :

- In only one patient supplementary attempt (N_1 -1) was used.
- No supplementary operators (N_2) were needed in all cases.
- Only two patients needed alternative (N_3) techniques for intubation. Macintosh blade was used to intubate. These patients had grade 1 view in Macintosh and grade 2a view in Videoscope. The epiglottis was floppy and passage of the tube through the tube guide was difficult.
- In 14 patients subjective lifting force (N_5) was applied during laryngoscopy.
- In 11 patients external laryngeal pressure (N_6) was needed to align the pointer to the endotracheal tip.
- In all patients the vocal cords were in abducted position (N_7).
- Total IDS of 1 was noted in 32 patients; 2 in 7 patients and 3 in one patient.
- The maximum score was 3 seen in one patient with N_1-1 ; N_4-1; N_6-1.

Another difficulty encountered in some patients was fogging of the lens and blurring of vision but intubation was successful in our study. In the study conducted by Ishwar singh, abhijit khaund, Abhishek gupta, Department of

Anaesthesiology,Jaipur Golden Hospital, New Delhi, three cases had the problem of blurring of view requiring repeated attempt. They successfully overcame this difficulty by warming the distal end of the optical tube by dipping in warm water just prior to laryngoscopy or by the use of continuous flow of oxygen by the oxyport at 6 L/ Min.

EFFECTIVE INTUBATION TIME :

- The mean time to intubate was 17 seconds which is comparable and less than other studies.
- Intubation time range was 10 to 25 seconds.
- 58.8% were intubated in 10 to 15 seconds.

In the study conducted by Ishwar singh, Abhijit khaund, Abhishek gupta, Department of Anaesthesiology,Jaipur Golden Hospital, New Delhi, intubation was possible in 88% of cases within stipulated time of one minute and mean time of 28.6 seconds.

The study conducted by Y. Toyama , N. Katsumi , T. Kunisawa , R. Sasaki K. Hirota the mean (SD) time required to place the tracheal tube was 20 seconds.

In the study conducted by P. Wong, C. Lawrence, P. Charters and M. Halligan - *London, Liverpool, UK (* Intubation times for using the Bonfils intubation

fibrescope - Their clinical experience in 36 unselected patients (31 by P.W. and five by C.L.) has been less favourable with an median intubation time of 80 s (range 34–282 s).

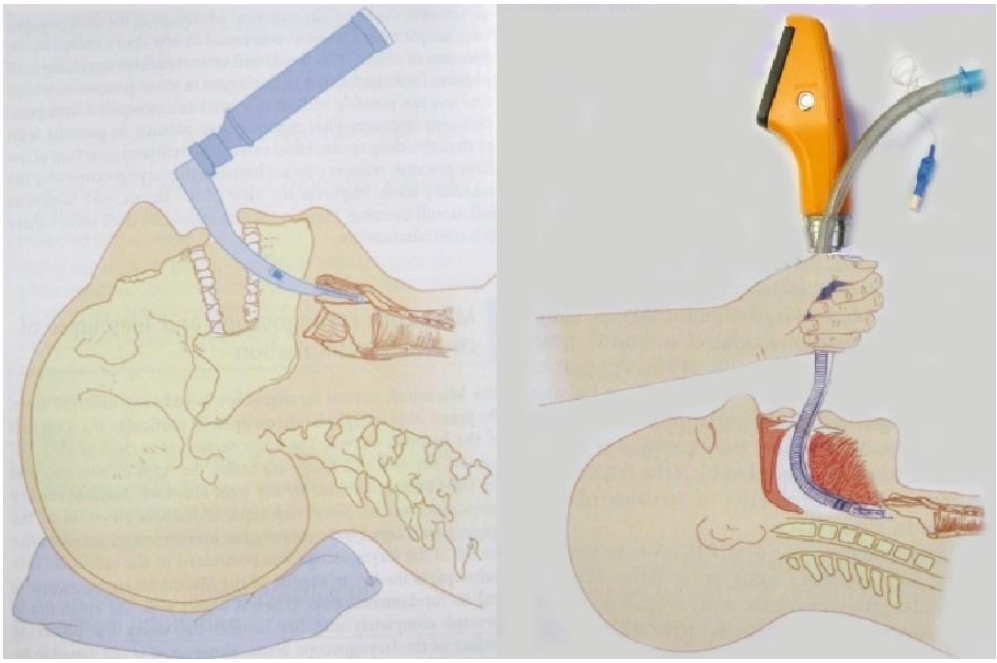
AIRWAY TRAUMA :

- Minor degree of airway trauma noted in 5 patients.
- 2 patients had abrasion of lips; 2 patients had minor abrasion in pharynx and in 1 patient abrasion in base of epiglottis noted.

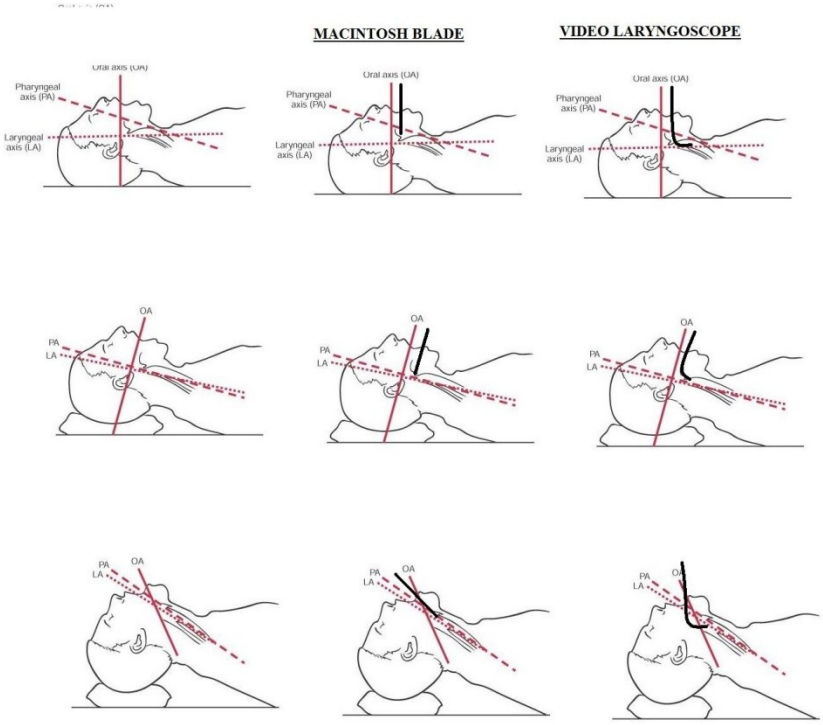
In the study conducted by Ishwar singh, abhijit khaund, Abhishek gupta, Department of Anaesthesiology,Jaipur Golden Hospital, New Delhi, No significant complication like oro-pharyngeal trauma or extreme pressor response was noted.

Acute traumatic complications Injury to the lips, teeth, tongue, nose, pharynx, larynx, trachea and bronchi can occur during laryngoscopy and intubation. Traumatic complications have been extensively described in two excellent reviews. 1. *Weber S. Traumatic complications of airway management.* Anesthesiology Clinics of North America 2002; 20: 503-512. and in 2. Loh KS, Irish JC. *Traumatic complications of intubation and other airway management*

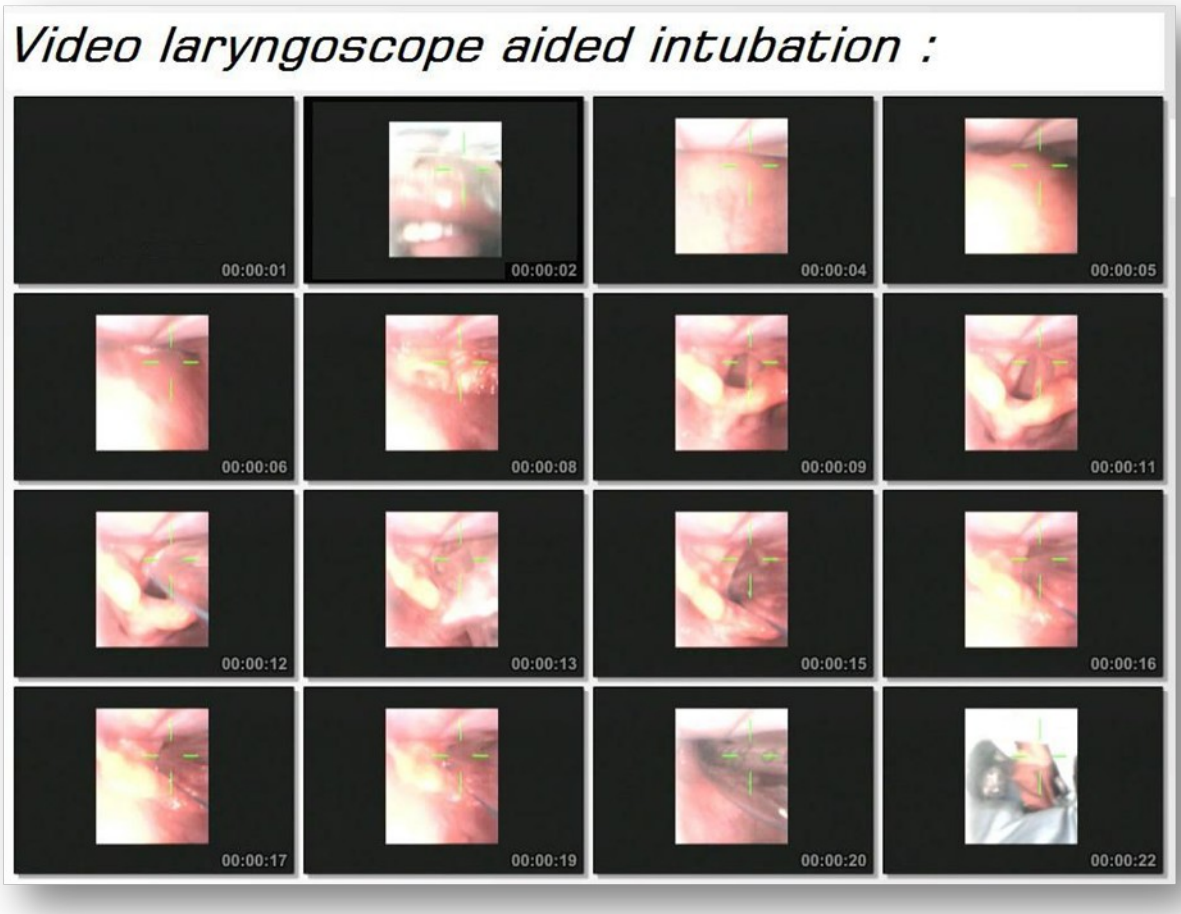
procedures. Anesthesiology 2002; 20: quoting that " Minor trauma to the airway is common and incidence increases with increasing duration , increasing grade of difficulty, female gender and >60 yrs age. Most traumatic complications do not result in major morbidity or mortality. However, some require immediate recognition and management."



COMPARISON OF MACINTOSH & VIDEOLARYNGOSCOPE BLADES



BLACK MARKING REPRESENTS THE AXIS OF THE BLADE.



VIEW OF LARYNX IN VIDEOLARYNGOSCOPE MONITOR

CONCLUSION

Video laryngoscope significantly improves laryngeal exposure and facilitates rapid, easy and reliable intubation.

It can be useful in routine anaesthesia care and also in anticipated and unanticipated difficult intubation.

The improved coordination afforded by an image on a video monitor seen by both the assistant providing laryngeal manipulation and the anaesthesiologist handling the laryngoscope results in a significant advantage over the conventional laryngoscope technique. As a consequence, the learning curve is short.

It can be considered that the video laryngoscope will be a useful addition to the range of difficult airway devices available and it may obviate the need of more sophisticated and complex airway instruments like flexible fibre optic laryngoscope, to a particular extent.

PROFORMA :

NAME : AGE : SEX : I.P. NO :

DIAGNOSIS : SURGERY PLANNED :

PRE OPERATIVE ASSESSMENT :

HISTORY :

CO-MORBID ILLNESS & TREATMENT DETAILS -

EFFORT TOLERANCE - _____METS.

H/O PREVIOUS SURGERY (ANY DOCUMENTED DIFFICULT AIRWAY) –

H/O TRAUMA/ BURNS/ TUMOURS INVOLVING AIRWAY –

H/O SNORING –

H/O VOICE CHANGE –

GENERAL EXAMINATION :

HEIGHT : WEIGHT : BMI:

ANAEMIA- JAUNDICE- CERVICAL SPINE : TONGUE :

PR- BP- CVS- RS -

AIRWAY EXAMINATION :

GROSS ALTERATION IN AIRWAY ANATOMY :

HAIR BUN : BEARD:

NECK FLEXION : NECK EXTENSION :

INTER INCISOR DISTANCE : THYRO MENTAL DISTANCE :

STERNO MENTAL DISTANCE : NEUTRAL : MAX. EXTENSION with mouth closed :

UPPER LIP BITE TEST : NECK CIRCUMFERENCE :

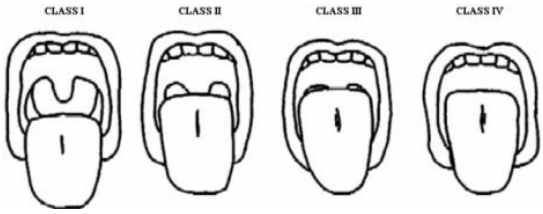
RECEDING MANDIBLE : PALATE CONFIGURATION :

DENTURES :

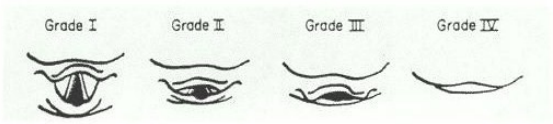
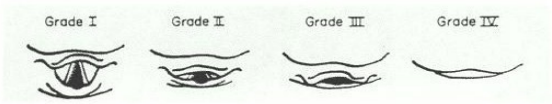
ARTIFICIAL (REMOVABLE / FIXED) : BUCK TEETH : UPPER INCISOR LENGTH :

LOOSE TEETH : CRACKED TEETH : ABSENT TEETH :

MODIFIED MALLAMPATI CLASSIFICATION : (mark- O)



COOKS MODIFICATION OF CORMACK & LEHANE GRADING :

MACINTOSH LARYNGOSCOPE	**VIDEO**
 a b a b	 a b a b

1. NUMBER OF ATTEMPTS :
2. NUMBER OF SUPPLEMENTRY OPERATORS :
3. NUMBER OF ALTERNATIVE TECHNIQUES : (change of blade / use of bougie):
4. CORMACK & LEHANE GRADE minus 1 :
5. LIFTING FORCE :

6. EXTERNAL LARYNGEAL MANIPULATION : (needed / not needed) :
7. POSITION OF VOCAL CORDS : (abducted / adducted) :

N1	N2	N3	N4	N5	N6	N7

DURATION : _____ SECONDS

AIRWAY TRAUMA :

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